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Is a higher wage in the primary sector beneficial to worker households?: Analysis based on a dual labor market model[*]

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Abstract

Constructing a dual labor market model that is composed of the primary sector, where the wage is determined through labor–management negotiations, and the secondary sector, where the wage is determined competitively, we explore whether a higher wage in the primary sector benefits a typical worker household where the husband works in the primary sector and the wife works in the secondary sector. We show that in the right-to-manage model, where only the wage is bargained, it may not be beneficial, while in the efficient bargaining model, where both wage and employment are bargained, it is beneficial.

Keywords: dual labor market, trade union, primary earner, secondary earner, household income, working class

JEL Classification: E10, E24, J01

1. Introduction

In Japan, the share of non-regular workers as a proportion of the total labor force has been increasing over the past 30 years. According to the Statistics Bureau, Ministry of Internal Affairs and Communications (2018), the ratio of non-regular workers, which stood at approximately 20% three decades ago, had risen to 40% in 2018. There are also large disparities between regular and non-regular workers with respect to hourly wage and annual income. According to the Cabinet Office, Government of Japan (2017), the average hourly wage and the average annual income of regular workers are, respectively, 1.5 and 1.8 times those of non-regular workers. This means that the Japanese economy can be characterized as a dual labor market economy.

This paper is aimed at investigating whether a higher wage in the regular employment sector (hereafter referred to as the primary sector) benefits worker households in a dual labor market economy. In this paper, we assume that an increase in the wage is caused not by an increase in worker productivity but by an increase in their bargaining power. An increase in the wage in the latter sense possibly decreases employment in the primary sector, transfers the fired workers to the non-regular employment sector (hereafter referred to as the secondary sector), and results in a lower wage there. Thus, from the perspective of individual workers, such a change benefits the primary sector's workers who are not fired, not the secondary sector's workers.

However, in reality, a household often consists of workers in both sectors. A typical case is that of a husband (wife) working in the primary (secondary) sector as a primary (secondary) earner. Higuchi and Ishii (2015) show that in Japan, such households accounted for approximately 20% of all types of households in 2004 but that this had risen to 31% in 2014. They also pointed out that 55% of non-regular workers between 20 and 65 years of age were married women, indicating that they chose part-time jobs to supplement their husband's wage income while handling housework and childcare. In this case, a rise in the primary sector's wage pulls up the husband's wage income; however, it may also pull down the wife's wage income further. Such a change may harm the total income and utility of the typical household. In other words, a rise in the primary sector's wage, although seemingly desirable for the worker household, may result in lower income and utility. The purpose of this paper is to examine theoretically under what conditions such a paradoxical result can hold, by using a simple dual labor market model.

There have been a number of studies on the dual labor market, which are roughly classified as those with models where the trade union determined the wage (and employment) in the primary sector (McDonald and Solow (1985)) and those where wage determination was based on the efficiency wage hypothesis (Bullow and Summers (1986), Jones (1987), and Saint-Paul (1997)). In the present paper, we adopt the former formulation, given that in Japan the trade unions are organized at each company (namely, the enterprise-based union) and that its main members are regular and permanent employees of the firms.[1]

McDonald and Solow (1985) presented a dual labor market model to explain the stylized fact in the United States that the adjustment of employment (wage) is relatively larger (smaller) in the primary sector than that in the secondary sector during business cycles. Subsequently, de Groot (2001), Nakatani (2004), Palma and Seegmuller (2004),

[1] Faced with a decline in the ratio of regular workers to total workers, trade unions have recently sought to increase their numbers of non-regular workers. However, according to Kamuro (2016), the ratio of unionized part-time workers to total union members is only 10.4% and the estimated union density rate of part-time workers is only 7.0%.

Sanner (2006), and Dittrich (2008), as well as others, also studied dual labor market models with trade unions but for various other purposes.[2] These studies, however, do not consider the fact that a household often consists of workers in both sectors, and that is the focus of this paper.

There are a few studies, though, that do incorporate the abovementioned feature of the typical Japanese household that the husband (wife) works in the primary (secondary) sector, and to the best of my knowledge, Yoshikawa's (1995, ch 3) work is a pioneering one on this subject. He presented a short-run (Keynesian) model[3] to explain the stylized fact regarding Japan that wage (employment) adjustment is relatively larger (smaller) in the primary sector during business cycles (which is contrary to the case of the U.S.). Subsequently, Osumi (1999, ch7, ch 8) and Nakatani (2013) expanded the Yoshikawa model,[4]; however, all these studies are different from ours with respect to both the aim of the analysis and the set-up of the model. In sum, the question of whether a rise in the primary sector's wage benefits the typical worker household has not been examined, and

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[2] Constructing an endogenous growth model with monopolistic competition in the goods market, de Groot (2001) studied the relationship between "wait unemployment" in the secondary sector and economic growth caused by R&D activity in the primary sector. Using a simple static macroeconomic model with monopolistic competition in the goods market, Nakatani (2004) investigated the effects of changes in the unions' bargaining power, labor productivities, and the firm's monopoly power on wages, employment, income distribution, and output. Palma and Seegmuller (2004) examine how a dual labor market affects the indeterminacy of macroeconomic dynamics. Extending the work of Blanchard and Giavazzi (2003) to a dual labor market framework, Sanner (2006) examined whether the union wage gap, which was estimated empirically by Blanchflower (1996), could be replicated in his model. Dittrich (2008) studied the effect of the centralization of union wage bargaining on social welfare.

[3] Yoshikawa adopted the efficiency wage model—not the union bargaining model—to derive the wage gap between the two sectors.

[4] Osumi (1999, ch 7, ch 8) introduced heterogenous workers (namey, skilled workers, who are complementary to physical capital, and unskilled workers, who are not) into the hybrid model of McDonald and Solow (1985) and Yoshikawa (1995, ch 3). Nakatani (2013) introduced the minimum wage in the secondary labor market into a Yoshikawa-type dual labor market model.

the main contribution of this paper is its detailed investigation of this aspect.

Our main results are twofold. First, in the right-to-manage model, where only the wage is determined in labor–management negotiations, a higher wage in the primary sector caused by a rise in the union's bargaining power can harm both the income and utility of the typical worker household. This is mainly because a higher wage in the primary sector reduces the employment in that sector, transfers the fired workers to the secondary sector, and can cause a fairly large decline in the wage there. Second, in the efficient bargaining model, where both wage and employment are determined through negotiations, the opposite result holds; namely, a higher wage in the primary sector improves both the income and utility of the typical worker household. This is mainly because in this model a higher primary sector's wage reduces the wife's secondary labor supply and accordingly results in the higher secondary sector's wage. That is to say, the effects of a higher primary sector's wage are quite different between the two bargaining processes.

The rest of this paper is organized as follows. In Section 2, we present a basic theoretical framework with the right-to-manage model and investigate the effects of a rise in the union's bargaining power on household income and utility. In Section 3, we examine the efficient bargaining model and compare the results with those derived from the previous section. Finally, Section 4 concludes the paper.

2. The right-to-management model

We present a basic theoretical framework of the dual labor market economy with trade unions and investigate the effects of an increase in the union's bargaining power on both the income as well as the utility of each type of household. In this section, we consider the right-to-management model, where only the wage is determined in the labor–management negotiations.[5]

2.1 The household

We assume that the household sector has L worker households and a capitalist (or a stockholder).

A worker household is made up of two workers: a "husband" (or a primary earner) who wishes to work in the primary sector and a "wife" (or a secondary earner) who works in the secondary sector. Each husband is endowed with one unit of time and supplies it inelastically to the primary sector (therefore, L units of labor are supplied in the primary sector). However, since the primary sector's wage is set higher than the competitive level through labor–management negotiations, the labor supply (=L) exceeds the labor demand (denoted by L_1). Thus, the number of husbands who are employed in that sector is $L_1(< \mathrm{L})$, and the remaining $\mathrm{L}-L_1$ of them supply 1 unit of time to the secondary sector. Each wife is also endowed with 1 unit of time, allocates a part of the time l_j to the labor supply in the secondary sector, and devotes the rest $1-l_j$ to leisure. Here, it is possible (and more natural) to interpret that $1-l_j$ is not leisure but housework handled by the wife. The subscript j denotes the type of household. $\mathrm{j}=1$ $(\mathrm{j}=2)$ means a household where a husband is employed in the primary (secondary) sector, and $\mathrm{j}=3$ means a capitalist. The total income of a worker household is the sum of a husband's and wife's wage income, with each household spending its entire income on consumption.

The utility maximization problem of the household of type 1 $(\mathrm{j}=1)$ is formulated as follows:

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[5] The right-to-manage model was first formulated by Nickell and Andrews (1983).

$$\max_{c_1, l_1} U_1 = (c_1)^{\alpha}(1-l_1)^{1-\alpha} \;\; s.t.\, c_1 = w_1 + w_2 l_1. \tag{1}$$

Here, U_1, c_1, and l_1 denote, respectively, utility, consumption, and the wife's labor supply in a type 1 household. w_1 (w_2) denotes the wage rate in the primary (secondary) sector. Solving this, we obtain the following:

$$c_1 = \alpha(w_1 + w_2), \tag{2.a}$$

$$l_1 = \alpha - (1-\alpha)\frac{w_1}{w_2}, \tag{2.b}$$

$$U_1 = A(w_1 + w_2)w_2^{-(1-\alpha)}. \, (A = \alpha^{\alpha}(1-\alpha)^{1-\alpha}) \tag{2.c}$$

From (2.b), we can see that l_1 (a wife's labor supply) is a decreasing function of her husband's wage w_1. Many empirical studies report that such a relationship holds true in Japan.[6]

Similarly, the utility maximization problem of the household of type 2 (j = 2) is as follows:

$$\max_{c_2, l_2} U_2 = (c_2)^{\alpha}(1-l_2)^{1-\alpha} \;\; s.t.\, c_2 = w_2 + w_2 l_2. \tag{3}$$

Here notice that the husband's wage is w_2 (not w_1). Solving this, we obtain the following:

$$c_2 = 2\alpha w_2, \tag{4.a}$$

$$l_2 = 2\alpha - 1, \tag{4.b}$$

$$U_2 = 2Aw_2^{\alpha}. \, (A = \alpha^{\alpha}(1-\alpha)^{1-\alpha}) \tag{4.c}$$

[6] According to the Ministry of Internal Affairs and Communications (2012), the ratio of households in which the wife has a job, to all households is largest when the annual income of her husband ranges between 2.5 and 3.0 million yen, and the rate declines as the husband's income rises. This fact is consistent with the relationship expressed by (2.b). Kishi (2012) surveyed empirical studies on the wife's labor supply in Japan and reported that many of them support the relationship (2.b) although this does not necessarily hold true for more educated households and those with a young married couple.

As the ratio of the husband's wage to the wife's wage is 1 (namely, a constant), the wife's labor supply l_2 is also a constant.

The household of type 3 (j = 3) (namely, a capitalist) does not supply labor, receives the firm's profit π, and spends all the profits on consumption. Thus, their behavior is given by the following:

$$c_3 = \pi. \tag{5}$$

Note that a capitalist's utility is equivalent to her consumption because they do not supply labor.

In this paper, we ignore the type of worker household in which both husband and wife work in the primary sector because, here, the household income and utility correspond one-on-one with the primary sector's wage; it is not worth complicating the model by introducing this type of household. For the same reason, we also ignore the single-worker household.

2.2 The firm and the trade union

In this subsection, we formulate the behaviors of the firm and the trade union. With respect to labor–management negotiations, we consider the right-to-manage model, where only the wage is bargained and employment is determined by the firm after the negotiations. As we must solve the model backward, we first formulate the firm's profit maximization problem under a given wage, and then, we formulate the bargaining problem.

2.2.1 The firm's profit maximization

We assume that the economy is characterized by a single firm, which produces the final goods by using two kinds of labor–primary and secondary. The profit of the firm is given by the following:

$$\pi = \mathrm{Y} - (w_1 L_1 + w_2 L_2). \tag{6}$$

Here Y, L_1, and L_2 are the output, the primary labor input, and the secondary labor input, respectively. The price of the final goods is normalized to one. The production function of the firm is assumed to be of the Cobb–Douglas type:[7]

$$\mathrm{Y} = L_1^a L_2^b, (0 < a < 1, 0 < b < 1, 0 < a + b < 1), \tag{7}$$

where the two parameters (a *and* b) stand for the primary labor share and the secondary labor share, respectively. The firm maximizes the profit (6) subject to the production function (7). Thus, the optimal labor demand, the maximized profit, and the profit share can be calculated as follows:

$$L_1 = (a)^{\frac{1-b}{\Delta}}(b)^{\frac{b}{\Delta}}(w_1)^{-\frac{1-b}{\Delta}}(w_2)^{-\frac{b}{\Delta}}, (\Delta = 1 - (a + b)) \tag{8.a}$$

$$L_2 = (a)^{\frac{a}{\Delta}}(b)^{\frac{1-a}{\Delta}}(w_1)^{-\frac{a}{\Delta}}(w_2)^{-\frac{1-a}{\Delta}}, \tag{8.b}$$

$$\pi = \Delta(a)^{\frac{a}{\Delta}}(b)^{\frac{b}{\Delta}}(w_1)^{-\frac{a}{\Delta}}(w_2)^{-\frac{b}{\Delta}}, \pi/Y = \Delta. \tag{8.c}$$

2.2.2 Labor–management negotiations

For labor–management negotiations in the primary sector, we follow McDonald and Solow (1985).[8] The trade union represents an exogenously given number (M) of members (husbands), and its aim is to maximize their expected utility V. As the union's wage-

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[7] If a CES-type production function is assumed, we can consider cases where the two labors are both substitutes and complementary. Making this assumption, however, will make the comparative statics complicated and ambiguous. As the purpose of this paper is not to examine these cases, we assume the simple Cobb–Douglas type production function.

[8] We consider both the right-to-manage model and the efficient bargaining model, while McDonald and Solow (1985) considered only the latter.

setting behavior may result in some members not being employed in the primary sector but in the secondary sector, the expected utility of the union can be expressed as $V = (L_1/M)U_1 + [1-(L_1/M)]U_2$. Meanwhile, the firm's aim is to maximize the profit π. When the negotiations break down, the payoffs of the trade union and the firm are U_2 and zero, respectively. Assuming standard Nash bargaining, the labor–management negotiation problem can be formulated as follows:

$$\max_{w_1} Z = \pi^{1-\delta}[L_1(U_1 - U_2)]^{\delta}, \text{ s.t. } (2.\mathrm{c}), (4.\mathrm{c}), (8.\mathrm{a}), (8.\mathrm{c}) \tag{9}$$

where Z is the Nash product[9] and $\delta (0 < \delta < 1)$ is the union's bargaining power.[10] Solving this, we have the following:

$$w_1 = (1+\phi)w_2. \left(\phi = \frac{\Delta}{a}\delta, \Delta = 1-(a+b)\right) \tag{10}$$

Equation (10) means that the union sets the markup and that this markup is equal to ϕ on the secondary sector's wage. This negotiation premium ϕ is proportionate to the union's bargaining power δ.

Finally, substituting (10) in (8.a), (8.b), and (8.c), we have the following:

$$L_1 = B_1(1+\phi)^{-\frac{1-b}{\Delta}}(w_2)^{-\frac{1}{\Delta}}, \left(B_1 = (a)^{\frac{1-b}{\Delta}}(b)^{\frac{b}{\Delta}}\right) \tag{11.a}$$

$$L_2 = B_2(1+\phi)^{-\frac{a}{\Delta}}(w_2)^{-\frac{1}{\Delta}}, \left(B_2 = (a)^{\frac{a}{\Delta}}(b)^{\frac{1-a}{\Delta}}\right) \tag{11.b}$$

$$\pi = \Delta(a)^{\frac{a}{\Delta}}(b)^{\frac{b}{\Delta}}(1+\phi)^{-\frac{a}{\Delta}}(w_2)^{-\frac{a+b}{\Delta}}. \tag{11.c}$$

2.3 Comparative statics in market equilibrium

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9 The Nash product is defined as $Z = (\pi - 0)^{1-\delta}(V - U_2)^{\delta}$. As M (the number of union members) is exogenous, it is expressed as $Z = \pi^{1-\delta}[L_1(U_1 - U_2)]^{\delta}$.

10 McDonald and Solow (1985) considered the case of $\delta = 1/2$, that is, where the bargaining powers of both parties are equal. Meanwhile, we denote the union's bargaining power by the parameter δ because the purpose of this paper is to study comparative statics results with respect to the union's bargaining power.

2.3.1 The effect of a change in the union's bargaining power on wages and employment

First, we consider the equilibrium in the secondary labor market. The secondary labor demand is given by (11.b). With respect to the secondary labor supply L_2^s, as the wife of a type 1 household supplies l_1 units of time (see (2.b)) and a husband and wife of a type 2 household supply, respectively, 1 and l_2 units of time (see (4.b)), we get the following:

$$L_2^s = L_1 l_1 + (L - L_1)(1 + l_2) = -B_1[\alpha + (1-\alpha)(1+\phi)](1+\phi)^{-\frac{1-b}{\Delta}}(w_2)^{-\frac{1}{\Delta}} + 2\alpha L. \quad (12)$$

From (11.b) and (12), we can calculate the equilibrium secondary sector's wage w_2 as follows:

$$w_2 = \left[\frac{(1+\phi)^{-\frac{a}{\Delta}}[B_2 + B_1\{\alpha(1+\phi)^{-1} + (1-\alpha)\}]}{2\alpha L}\right]^{\Delta}, \frac{\partial w_2}{\partial \delta} < 0. \quad (13)$$

From (13), we can see that an increase in the union's bargaining power δ reduces w_2. The intuitive reasoning for this result is as follows. An increase in δ, on the one hand, pulls down the secondary labor demand (11.b) under a given w_2. This is because it stimulates the primary sector's wage w_1, reduces this sector's employment, and accordingly lowers the marginal productivity of secondary labor. An increase in δ, on the other hand, pulls up the secondary labor supply L_2^s under a given w_2. There are two channels through which it affects L_2^s. First, an increase in δ lowers $L_1 l_1$ (the total secondary labor supply of a type 1 household) because it raises w_1 and therefore reduces both the number of husbands employed in the primary sector L_1 as well as their wives' labor supply l_1. Second, an increase in δ raises $(L - L_1)(1 + l_2)$ (the total secondary labor supply of a type 2 household) because husbands who lose their jobs in the primary sector move to the secondary sector, which, in turn, raises $L - L_1$. In our model, the second positive effect exceeds the first negative effect; hence, an increase in δ pulls up L_2^s. Figure 1 depicts these changes graphically. An increase in δ shifts the secondary labor demand curve (11.b) leftward and the secondary labor supply curve (12) rightward. Hence, the equilibrium wage necessarily decreases, while the equilibrium employment increases because the rightward shift of the labor supply curve is larger than the leftward shift of the labor demand curve.

(Figure 1 around here)

Next, we consider the equilibrium in the primary labor market. From (10) and (13), we can easily see that an increase in δ raises the equilibrium primary sector's wage w_1. The intuitive reason is as follows. An increase in δ has two opposite effects on $w_1(=(1+\phi)w_2)$. First, it raises the negotiation premium ϕ. Second, it reduces w_2 as demonstrated in (13). As the former positive effect exceeds the latter negative effect, an increase in δ pulls up w_1. With respect to the primary sector's employment L_1, we can confirm by (11.a) and (13) that an increase in δ reduces L_1. There are two opposite effects at play here. An increase in δ has a negative effect on L_1 through an increase in w_1. It also has a positive effect on L_1 because it stimulates the marginal productivity of primary labor by raising L_2. As the former negative effect exceeds the latter positive effect in our model, an increase in δ pulls down L_1.

Summarizing the discussion until now, we have the following proposition:

Proposition 1

In a right-to-manage model, an increase in the union's bargaining power δ *has the following effects on wages and employment:*

(1) In the primary sector, wage w_1 *rises and employment* L_1 *falls.*

(2) In the secondary sector, wage w_2 falls and employment L_2 rises.

2.3.2 The effect of a change in the union's bargaining power on household consumption

Next, we analyze the effect of a change in the union's bargaining power δ on household consumption. Note that in this model, household consumption and household income are equivalent because each household spends its entire income on consumption.

First, we consider the effect on c_2 (consumption of a type 2 household). As shown in (4.a), c_2 is proportionate to the secondary sector's wage w_2 because both husband and wife are employed in that sector. Hence, an increase in δ reduces c_2.

Second, we consider the effect on c_3 (consumption of a capitalist). From (5), c_3 is equal to the firm's profit π. From (11.c) and (13), we can confirm that an increase in δ raises π. The intuitive reason is as follows. As shown in the proposition 1, an increase in δ lowers (raises) employment in the primary (secondary) sector. Because the latter positive effect exceeds the former negative effect, the output increases. Since the profit share is constant (see (8.c)), the profit π also increases.

Finally, we consider the effect on c_1 (consumption of a type 1 household). From (2.a), (10), and (13), we can calculate c_1 as follows:

$$c_1 = K_1(2+\phi)(1+\phi)^{-a}[B_2 + B_1\{\alpha(1+\phi)^{-1} + (1-\alpha)\}]^{\Delta}. \tag{14}$$

Here, K_1 is a constant that does not depend on δ. From (14), we have the following:

$$\frac{\partial c_1}{\partial \delta} \gtreqless 0 \; when \; F = [(1+\phi) - a(2+\phi)]\left[\frac{b}{a} + (1-\alpha)\right] + \alpha - \alpha(1-b)\frac{2+\phi}{1+\phi} \gtreqless 0. \tag{15}$$

Therefore, if the condition $F < 0$ holds true, an increase in δ reduces the consumption of a type 1 household.

Is $F < 0$ satisfied under plausible values of exogenous parameters? To check this, we set their numerical values as follows:

(Table 1 around here)

Two parameters (a, b) indicate the primary and secondary labor shares, respectively. According to the Cabinet Office, Government of Japan (2018), the total labor share in Japan is approximately 70%, which means $a + b = 0.7$. According to the Statistics Bureau, Ministry of Internal Affairs and Communications (2018), as well as the Cabinet Office, Government of Japan (2017), the ratio of regular workers to the total labor force is 0.63 and the average annual income of regular workers is approximately 1.8 times that of non-regular workers. From these data, we can calculate the numerical values of (a, b) as (0.53, 0.17). Next, the parameter ϕ represents how much higher the primary sector's wage is than the secondary sector's wage, and we set its numerical value as $\phi = 0.5$ because the Cabinet Office, Government of Japan (2017), shows that the former is approximately 1.5 times the latter. Finally, the parameter α corresponds to the relative weight of consumption in the utility evaluation, and we set its numerical value as 0.67 on the basis of McCandless (2008).[11] Concerning this parameter, we also consider the different numerical values in the analysis below.

Under the parameter values shown in Table 1, we can confirm that $F < 0$, which indicates that an increase in δ lowers the consumption (or income) of a type 1 household. The result remains unchanged when the value of α is reset downward to 0.5. When the value of α is further lowered to 0.4, however, $F > 0$ holds true; therefore, an increase in δ raises household consumption in this case. From these results, we can conclude

[11] McCandless (2008) specifies the utility function as $u(c, l) = \ln c + A \ln(1 - l)$ and sets $A = 0.5$ in the numerical analysis.

that an increase in δ lowers the consumption of a type 1 household under plausible parameter values although the opposite result holds true when α is set at a low value. Thus, we have the following proposition:

Proposition 2

In the case of the right-to-manage model, an increase in the union's bargaining power δ *has the following effects on household consumption:*

(1) It lowers the consumption of a type 1 household under the condition $F < 0$*.*

(2) It lowers the consumption of a type 2 household.

(3) It raises the consumption of a type 3 household (a capitalist).

A higher wage in the primary sector that is caused by an increase in δ seemingly improves (harms) the consumption of worker households (capitalist); however, this proposition shows that the opposite result can hold true.

2.3.3 The effect of a change in the union's bargaining power on household utility

As household utility depends not only on consumption but also on leisure, the effect of an increase in the union's bargaining power δ on household utility may be different from the effect on consumption that we discussed in the previous subsection. In this subsection, we study the effect on household utility.

First, we consider the effect on U_2 (utility of a type 2 household). As shown in (4.c), U_2 is an increasing function of the secondary sector's wage w_2 because both husband and wife are employed in that sector. Hence, an increase in δ reduces U_2.

Second, we consider the effect on the utility of a capitalist. As she does not supply labor, her utility and her consumption are equivalent. Hence, as δ increases, the utility of a capitalist rises.

Finally, we consider the effect on U_1 (utility of a type 1 household). From (2.c), (10) and (13), we can calculate U_1 as follows:

$$U_1 = K_2(2+\phi)(1+\phi)^{-a\alpha}[B_2 + B_1\{\alpha(1+\phi)^{-1} + (1-\alpha)\}]^{\alpha\Delta} \tag{16}$$

Here, K_2 is a constant that does not depend on δ. From (16), we have the following:

$$\frac{\partial U_1}{\partial \delta} \gtreqless 0 \; when \; G = [(1+\phi) - a\alpha(2+\phi)]\left[\frac{b}{a} + (1-\alpha)\right] + \alpha - \alpha^2(1-b)\frac{2+\phi}{1+\phi} \gtreqless 0 \tag{17}$$

Therefore, if the condition $G < 0$ holds true, an increase in δ reduces the utility of a type 1 household.

How likely is it that $G < 0$ holds true? We can confirm that $G > 0$ holds true under the parameter values shown in Table 1. The result remains unchanged when the value of α is reset upward to 0.8. Accordingly, in these cases $\partial U_1/\partial \delta > 0$ holds true. When the value of α is further pulled up to 0.9, however, $G < 0$ (therefore, $\partial U_1/\partial \delta < 0$) holds true. In other words, an increase in δ harms the utility of a type 1 household if the relative weight of consumption (leisure) in the utility evaluation is sufficiently high (low).

Summarizing these results, we have the following:

Proposition 3

In the case of the right-to-manage model, an increase in the union's bargaining power δ *has the following effects on household utility:*

(1) It lowers the utility of a type 1 household under the condition $G < 0$*.*

(2) It lowers the utility of a type 2 household.

(3) It raises the utility of a type 3 household (a capitalist).

Propositions 2 and 3 show that in the right-to-management model, a higher wage in the primary sector that is caused by an increase in δ is not necessarily beneficial to the typical (type 1) household. Does this "paradoxical" result still hold true when a different type of bargaining process is assumed? In the next section, we examine this point by assuming the efficient bargaining model, which is the other representative formulation of the bargaining process.

3. The efficient bargaining model

In this section, we consider the efficient bargaining model, where both wage and employment are determined through negotiations,[12] and re-examine the effects of an increase in the union's bargaining power on wages, employment, household consumption, and household utility.

3.1 The behaviors of the household, the firm, and the trade union

The utility maximization problem of each type of household is the same as that seen in the previous section (see (1) and (3)). With regard to labor–management negotiations, however, not only the primary sector's wage w_1 but also the employment in both sectors (L_1, L_2) is determined such that the Nash product is maximized. Thus, the bargaining problem is given by the following:

$$\max_{w_1, L_1, L_2} \; Z = \pi^{1-\delta}[L_1(U_1 - U_2)]^{\delta} \text{ s.t. (2.c), (4.c), (6), (7).} \tag{18}$$

The first order conditions of this problem are as follows:

$$(\partial Z/\partial w_1 = 0)\ (1-\delta)L_1(w_1 - w_2) = \delta\pi, \tag{19.a}$$

$$(\partial Z/\partial L_1 = 0)\ (1-\delta)L_1\left(aL_1^{a-1}L_2^{b} - w_1\right) = -\delta\pi, \tag{19.b}$$

[12] The efficient bargaining model was first formulated by McDonald and Solow (1981).

$$(\partial Z/\partial L_2 = 0)\ \mathrm{b}L_1^a L_2^{b-1} = w_2. \tag{19.c}$$

From (19.a) and (19.b), we have the following:

$$\mathrm{a}L_1^{a-1}L_2^b = w_2. \tag{20}$$

Equation (20) is the contract curve along which the isoprofit curves of the firm are tangential to the indifference curves of the union. In our model, it is independent on w_1 (namely, it is a vertical line on the (L_1, w_1) plane).

From (19.c) and (20), we have the following:

$$L_1/L_2 = a/b. \tag{21}$$

This means that the ratio of L_1 to L_2 does not depend on the union's bargaining power δ[13], and therefore, they co-move by a change in δ. Substituting (21) in (20), we can derive the labor demands in both sectors as follows:

$$L_1 = B_1(w_2)^{-\frac{1}{\Delta}}, \left(B_1 = (a)^{\frac{1-b}{\Delta}}(b)^{\frac{b}{\Delta}}\right) \tag{22.a}$$

$$L_2 = B_2(w_2)^{-\frac{1}{\Delta}}. \left(B_2 = (a)^{\frac{a}{\Delta}}(b)^{\frac{1-a}{\Delta}}\right) \tag{22.b}$$

From (6), (20), and (21), we have the following:

$$\frac{\pi}{L_1} = \frac{(1-b)}{a}w_2 - w_1. \tag{23}$$

Substituting this in (19.a), we can derive the following:

$$w_1 = (1+\phi)w_2. \left(\phi = \frac{\Delta}{a}\delta\right) \tag{24}$$

Accordingly, the two models (the right-to-manage model and the efficient bargaining model) give the same result with respect to the primary sector's wage w_1.

3.2 The comparative statics under market equilibrium

[13] In the right-to-manage model, $L_1/L_2 = a/b(1+\phi)$ holds true; hence, the ratio depends on δ.

3.2.1 The effect of a change in the union's bargaining power on wages and employment

First, we consider the equilibrium in the secondary labor market. The secondary labor demand is given by (22.b), while from (22.a), (2.b), and (4.b), the secondary labor supply L_2^s can be calculated as follows:

$$L_2^s = L_1 l_1 + (L - L_1)(1 + l_2) = -B_1[\alpha + (1-\alpha)(1+\phi)](w_2)^{-\frac{1}{\Delta}} + 2\alpha\text{L}. \tag{25}$$

Thus, we obtain the following:

$$w_2 = \left[\frac{B_2 + B_1\{\alpha + (1-\alpha)(1+\phi)\}}{2\alpha L}\right]^{\Delta}, \frac{\partial w_2}{\partial \delta} > 0. \tag{26}$$

From (26), we can see that an increase in the union's bargaining power δ raises w_2, which is opposite to the result (13) in the right-to-manage model. The intuitive reason of this result can be explained as follows. Since the secondary labor demand curve (22.b) does not depend on δ, an increase in δ does not shift it under a given w_2. On the other hand, an increase in δ shifts the secondary labor supply curve (25) leftward because, by such a change, a wife's labor supply in a type 1 household falls, while the number of members in that household remains unchanged (see (22.a)). Notice that the direction of the secondary labor supply curve's shift in the efficient bargaining model is contrary to that in the right-to-manage model. In the latter model, an increase in δ shifted it rightward because it transferred the husbands from the primary sector to the secondary sector. Consequently, as depicted in Figure 2, an increase in δ leads to a higher w_2 and a lower L_2.

(Figure 2 around here)

Next, we consider the equilibrium in the primary labor market. From (21), both sectors' employment curves co-move, so an increase in δ lowers L_1. From (24), the primary sector's wage is given by $w_1 = (1+\phi)w_2$; hence, an increase in δ raises w_1 because it stimulates both w_2 and ϕ (the negotiation premium). Thus, the following proposition holds:

Proposition 4

In the case of the efficient bargaining model, an increase in the union's bargaining power δ has the following effects on wages and employment:

(1) In the primary sector, wage w_1 rises and employment L_1 falls.

(2) In the secondary sector, wage w_2 rises and employment L_2 falls.

3.2.2 The effect of a change in the union's bargaining power on household consumption and utility

We investigate the effects of an increase in the union's bargaining power δ on household consumption and utility.

From (2.c) and (24), consumption c_1 and utility U_1 of a type 1 household can be expressed as follows:

$$c_1 = \alpha(2+\phi)w_2, U_1 = A(2+\phi)w_2^{\alpha}.$$

As an increase in δ raises both ϕ (the negotiation premium) and w_2, it raises c_1 and U_1. Similarly, consumption c_2 and utility U_2 of a type 2 household are given, respectively, by (4.a) and (4.c); hence, an increase in δ also raises these.

With regard to the effect on a type 3 household (a capitalist), from (22.a), (23), and (24), the profit can be calculated as follows:

$$\pi = B_1 \frac{(1-\delta)\Delta}{a} w_2^{-\frac{a+b}{\Delta}}.$$

Thus, an increase in δ decreases c_3. This is because an increase in δ raises the wages of both the primary sector and the secondary sector and accordingly reduces the profit. An increase in δ also reduce the utility because consumption and utility are equivalent for a capitalist. Thus, we have the following proposition:

Proposition 5

In an efficient bargaining model, an increase in the union's bargaining power δ has the following effects on household consumption and utility:

(1) It raises both the consumption and the utility of a type 1 household.

(2) It raises both the consumption and the utility of a type 2 household.

(3) It lowers both the consumption and the utility of a type 3 household (a capitalist).

In the right-to-manage model in the previous section, we demonstrated that a higher wage in the primary sector caused by an increase in δ can harm (improve) the living standard of a worker's (capitalist's) household; however, proposition 5 shows that such a paradoxical result does not hold true in the efficient bargaining model. In other words, the effect of an increase in δ is quite different between the two bargaining processes. The main reason for the two types of bargaining process leading to opposite results is that in the right-to-manage model, an increase in δ lowers the secondary sector's wage w_2, while in the efficient bargaining model, it raises w_2.

4. Concluding remarks

Constructing a dual labor market model comprising the primary sector, where the wage is determined through labor–management negotiations, and the secondary sector, where the wage is determined competitively, we investigated the effects of a change in the union's bargaining power on wages, employment, household consumption, and household utility. Table 2 below summarizes all the comparative statics results obtained in this paper (RTM and EB in Table 2 mean the right-to-manage model and the efficient bargaining model, respectively).

(Table 2 around here)

The main purpose of this paper is to examine how an increase in the union's bargaining power, which causes a higher wage in the primary sector, affects the living standard of the typical worker household in which the husband works in the primary sector and the wife works in the secondary sector. We showed that in the right-to-manage model, an increase in the union's bargaining power can reduce both the income as well as the utility of the typical worker household under certain conditions. This is mainly because it lowers the secondary sector's wage through a transferring of the husbands, who lose their primary sector jobs, to the secondary sector. In addition, such a change improves the consumption of a capitalist who receives profit. We also demonstrated that in the efficient bargaining model, the opposite result holds true because in this case, an increase in the union's bargaining power does not stimulate the secondary labor supply and accordingly it raises the secondary sector's wage.

Finally, we wish to remark on an implication of the abovementioned results for the Japanese economy. In Japan, the base wage in the primary sector is negotiated in the annual synchronized union bargaining called Shunto (the Spring Wage Offensive). According to the conventional view, the wage increase rate set by the top firm in a major industry is taken as the standard in the bargaining process, and its influence spreads to other industries, medium- and small-scale companies, and finally, the non-union sector[14]. In other words, this stylized view indicates that a rise in the primary sector's wage basically pulls up the secondary sector's wage. As shown in our paper, however, the opposite result may hold true if the wage is solely targeted in the bargaining process, such as what we see in Shunto, and the secondary labor market is competitive. Our result may, therefore, be seen as casting a doubt on this view.

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[14] For example, see Sako (1997) for this conventional view.

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Parameter	A	b	ϕ	α
Value	0.53	0.17	0.5	0.67

Table 1: The numerical values of exogenous parameters

	w_1	w_2	L_1	L_2
RTM	+	−	−	+
EB	+	+	−	−

	c_1	c_2	c_3	U_1	U_2
RTM	− (when $f(\phi) < 0$)	−	+	− (when $g(\phi) < 0$)	−
EB	+	+	−	+	+

Table 2: All comparative statics results

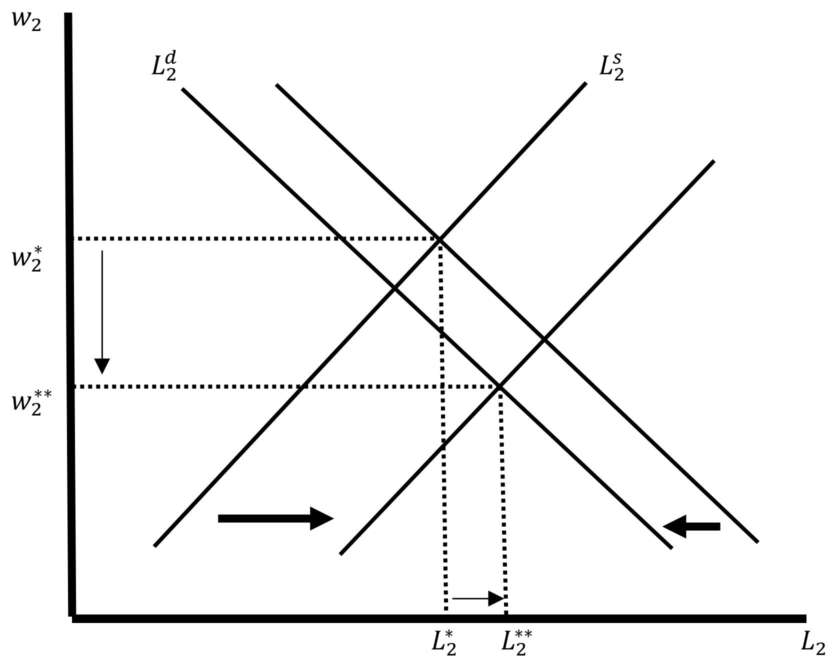

Figure 1: The secondary labor market equilibrium in the right-to-manage model

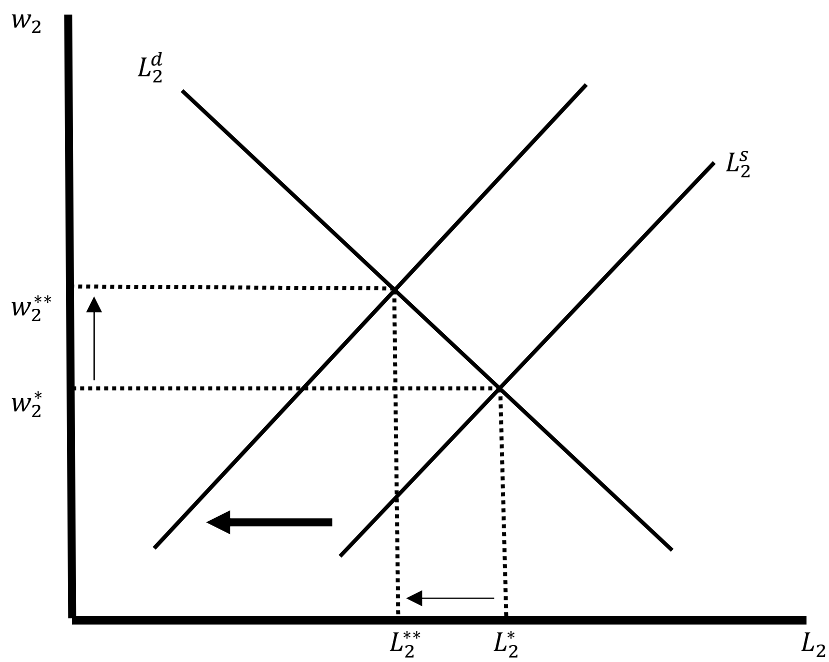

Figure 2: The secondary labor market equilibrium in the efficient bargaining model